

WHAT IS CLAIMED IS:

1. A process for preparing a charge-modified polyester substrate,
5 said process comprising the steps of:

(a) treating the substrate with an alkaline agent so as to cause
alkaline hydrolysis of polyester in said substrate;

10 (b) applying to the treated substrate of step (a) a poly-epoxy
charge-modifier having a fixed formal positive charge, one or more epoxy groups of
said charge-modifier being capable of bonding to said treated substrate; and

(c) drying the treated material.

15 2. The process as recited in claim 1 wherein step (a) takes place
concurrent with step (b).

20 3. The process as recited in claim 1 wherein step (a) takes place
before step (b).

4. A process for preparing a charge modified polyester substrate,
said process comprising the steps of:

25 (a) treating the substrate with an amine agent so as to cause
aminolysis of polyester in said substrate;

(b) applying to the treated substrate of step (a) a poly-epoxy
charge-modifier having a fixed formal positive charge, one or more epoxy groups of
30 said charge-modifier being capable of bonding to said treated substrate; and

(c) drying the treated material.

35 5. The process as recited in claim 4 wherein step (a) takes place
concurrent with step (b).

6. The process as recited in claim 4 wherein step (a) takes place
before step (b).

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7. A process for preparing a charge-modified polyester substrate, said process comprising the steps of:

5 (a) treating the substrate with an alkaline agent so as to cause alkaline hydrolysis of polyester in said substrate and with an amine compound so as to cause aminolysis of polyester in said substrate;

10 (b) applying to the treated substrate of step (a) a poly-epoxy charge modifier having a fixed formal positive charge, one or more epoxy groups of said charge modifier being capable of bonding to said treated substrate; and

(c) drying the treated material.

15 8. The process as recited in claim 7 wherein step (a) takes place concurrent with step (b).

20 9. The process as recited in claim 7 wherein step (a) takes place before step (b).

10. A process for removing anionic materials from a liquid comprising exposing the liquid to a cationically charge-modified polyester substrate having a positive zeta potential of such magnitude that the metanil yellow binding capacity is at least .004 mg of metanil per 1.0 grams of substrate, said charge-modified polyester substrate comprising:

(a) polyester substrate; and

30 (b) a polymeric cationic charge-modifying agent, said cationic charge modifying agent being chemically bonded to said polyester substrate.

11. A process for cationically charge-modifying a substrate comprising polyester, said process comprising:

35 (a) chemically bonding a charge-modifying amount of a cationic charge-modifying agent to the substrate so as to charge-modify substantially all of said polyester, wherein the charge-modifying agent comprises a polymer consisting of a plurality of monomers each bearing a fixed formal positive charge and one or more

epoxide groups, said epoxy groups capable of reacting with said polyester to form a chemical bond when said polyester is exposed to a quantity of alkaline agent(s) sufficient to cause alkaline hydrolysis of the polyester and/or a quantity of amine compounds sufficient to cause aminolysis of the polyester; and

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(b) drying the treated material.

12. A process for preparing a charge-modified polyester substrate, comprising:

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(a) applying to the substrate a charge-modifying system comprising:

a charge modifying agent comprising one or more epoxy groups and fixed formal positive charged groups, said epoxy groups capable of bonding to the surface of said polyester substrate when the polyester is said substrate is chemically modified to produce free carboxy or amine functionalities;

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an alkaline agent in sufficient concentration to cause hydrolysis of the polyester in said substrate;

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an aliphatic polyamine in sufficient concentration to cause aminolysis of the polyester in said substrate; and

(b) drying the treated material.

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13. The method as recited in claim 12 wherein the aliphatic polyamine is tetraethylene pentamine.

14. A method for producing a positively-charged polyester substrate, said method comprising:

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(a) immersing a polyester substrate into an aqueous organic solvent containing a polyamine in a concentration, and for a time, sufficient to cause aminolysis of said polyester in said polyester substrate;

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(b) reacting the polyester substrate of step (a) with a poly-epoxy charge-modifying agent carrying a fixed formal positive charge;

(c) drying the polyester substrate of step (b).

15. A method for producing a positively-charged polyester substrate, said method comprising:

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(a) immersing a substrate comprising polyester into a solvent containing an alkaline agent in a concentration, and for a period of time sufficient to cause hydrolysis of said polyester;

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(b) reacting the substrate of step (a) with a poly-epoxy charge-modifying agent carrying a fixed formal positive charge

(c) drying the substrate of step (b).

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16. A method for modifying polyester, comprising:

exposing a substrate of polyester to at least one agent sufficient to cause hydrolysis of the polyester and at least one modifier comprising one or more epoxy groups, wherein the one or more epoxy groups of the at least one modifier form a bond with the polyester.

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17. The method of claim 16 wherein the one or more epoxy groups are associated with a fixed negative charge.

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18. The method of claim 16 wherein the one or more epoxy groups are associated with a fixed positive charge.

19. The method of claim 16, wherein the at least one agent is an alkaline.

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20. The method of claim 16, wherein the at least one agent is an amine.

21. The method of claim 16, further comprising: drying the resulting polyester.

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22. The method of claim 16, wherein the at least one agent comprises: at least one alkaline and at least one amine.

23. The method of claim 16, wherein the polyester is exposed to the at least one agent before being exposed to the modifier.

5 24. The method of claim 16, wherein the polyester is exposed to the at least one agent and the modifier concurrently.

25. The method of claim 16 wherein the one or more epoxy groups are associated with one or more hydroxyl groups.

10 26. The method of claim 16 wherein the one or more epoxy groups are associated with one or more ethylene oxide groups.

15 27. The method of claim 16 wherein the one or more epoxy groups are associated with one or more hydroxyl and ethylene oxide groups.

28. The method of claim 16 wherein the one or more epoxy groups are associated with one or more groups having one or more fluorine atoms.

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